AMENDMENTS TO THE CLAIMS

1. (Cancelled)

2. (Currently Amended) A vehicle thermal system according to claim ~~1~~ 27 further comprising:

~~a thermostatic expansion valve; and~~

a ~~first~~ heat exchanger including a coolant side in fluid communication with the cooling loop, and a refrigerant side in fluid communication with the heating loop. ~~said bi-directional orifice separator reconfigurable to fluidically couple said thermostatic expansion valve to said heat exchanger~~[[.]]

3. (Currently Amended) A vehicle thermal system according to claim 2, the heating loop ~~further~~ comprising:

a thermostatic expansion valve in fluid communication with the evaporator;

~~a second heat exchanger, said~~ a bidirectional orifice separator in fluid communication with the ~~reconfigurable to fluidically couple said~~ thermostatic expansion valve and selectively in communication with the heat exchanger; ~~to said second heat exchanger~~ [[.]]

a outside air heat exchanger selectively in communication with the bidirectional orifice separator; and

a valve in fluid communication with the evaporator to selectively couple one of the heat exchanger, the outside air heat exchanger, and both the heat exchanger and the outside air heat exchanger to the bidirectional orifice separator.

4. (Currently Amended) A vehicle thermal system according to claim 3 wherein ~~said~~ the bidirectional orifice separator comprises a bidirectional orifice tube, ~~said~~ the bidirectional orifice separator operable to expand refrigerant flowing through the bidirectional orifice tube when ~~said~~ the bidirectional orifice separator is ~~fluidically connected~~ coupled to both ~~said~~ the ~~first~~ heat exchanger and ~~said~~ the ~~second~~ outside air heat exchanger.

5. (Cancelled)

6. (Currently Amended) A vehicle thermal system of claim ~~5~~ 27 ~~further comprising an HVAC unit for thermally coupling said air conditioning subsystem to said heating system, said~~ wherein both the evaporator and the heater core are in thermal communication with ventilation air, the HVAC unit further comprising:

~~an evaporator having refrigerant channels thermally connected to ventilation air;~~

~~a heater core having coolant channels thermally connected to ventilation air; and~~

a blower for blowing ventilation air ~~adjacent to said~~ over the evaporator to cool and dehumidify the ventilation air, and ~~adjacent to said~~ to blow the cooled, dehumidified ventilation air over the heater core ~~for transferring heat from the ventilation air into said refrigerant channels to transferring heat from said refrigerant channels into said ventilation air adjacent to said coolant channels through the bi-fluidic heat exchanger, and transferring heat from said coolant channels into said heater core~~ to heat and humidify the cooled, dehumidified ventilation air.

7. (Currently Amended) A thermal system for an electrically-powered vehicle having a power train, the thermal system comprising:

a reconfigurable refrigerant-based automotive air conditioning system ~~for creating at least one of~~ to selectively create a plurality of possible refrigerant loops, ~~said~~ the refrigerant-based automotive air conditioning subsystem comprising:

an evaporator having refrigerant channels thermally connected to ventilation air and configurable to receive previously cooled refrigerant, ~~said~~ the evaporator operable to cool and dehumidify the flow of ventilation air; and

a bi-fluidic heat exchanger having refrigerant channels thermally coupled to coolant channels;

a bidirectional orifice separator within ~~said~~ the at least one of ~~said~~ the plurality of possible refrigerant loops;

a compressor;

an outside air heat exchanger;

an accumulator fluidically coupled to an input of ~~said~~ the compressor;

a 4-way reversing valve configured to receive compressed refrigerant from ~~said~~ the compressor and operable to discharge compressed refrigerant into a selected one of the bi-fluidic heat exchanger and the outside air heat exchanger and to receive refrigerant from the non-selected one of the bi-fluidic heat exchanger and the outside air heat exchanger to discharge refrigerant from the non-selected one of the bi-fluidic heat exchanger and the outside air heat exchanger to ~~said~~ the accumulator; and

a reconfigurable liquid-coolant-based automotive heating system for creating at least one loop of ~~said~~ the plurality of the coolant loops, wherein the refrigerant-based automotive air conditioning system and the liquid-coolant-based automotive heating system are configured to operate concurrently and in concert.

8. (Currently Amended) A thermal system according to claim 7 wherein ~~said~~ the bidirectional orifice separator comprises:

a first shutoff valve fluidically coupled to ~~said~~ the bi-fluidic heat exchanger;

a second shutoff valve fluidically coupled to ~~said~~ the outside heat exchanger; and

a bidirectional orifice tube coupled in series between ~~said~~ the first shutoff valve and ~~said~~ the second shutoff valve for expanding refrigerant when ~~said~~ the first and second shutoff valves are open.

9. (Currently Amended) A thermal system according to claim 8 wherein ~~said~~ the heating system comprises:

a heater core; and

a 3-way valve for transferring coolant to ~~said~~ the heater core.

10. (Currently Amended) A thermal system according to claim 9 wherein ~~said~~ the evaporator is configured to receive refrigerant previously cooled in a bi-fluidic heat exchanger, ~~said~~ the bidirectional orifice separator including ~~said~~ the first shutoff valve, configured to permit flow of refrigerant into ~~said~~ the bidirectional orifice separator, ~~said~~ the second shutoff valve configured to prevent flow of refrigerant into the bidirectional orifice separator, and ~~said~~ the 4-way valve configured to select the bi-fluidic heat exchanger, ~~said~~ the refrigerant-based automotive air conditioning system thus configured comprising a first refrigerant loop of ~~said~~ the plurality of refrigerant loops operable to remove heat from ventilation air during dehumidification and transfer heat through the bi-fluidic heat exchanger to a coolant loop of the coolant-based heating system.

11. (Currently Amended) A thermal system according to claim 10, wherein ~~said~~ the coolant loop of the plurality of coolant loops comprises a first coolant loop coupled in series between ~~said~~ the heater core and ~~said~~ the bi-fluidic heat exchanger, ~~said~~ the 3-way valve configured to discharge coolant to ~~said~~ the heater core, and ~~said~~ the heater core configured to receive coolant from ~~said~~ the bi-fluidic heat exchanger.

12. (Currently Amended) A reconfigurable vehicle thermal control system, comprising:

~~a reconfigurable refrigerant-based air conditioning system for creating a plurality of refrigerant loops, each said loop including a bidirectional orifice separator;~~

a heating loop;

a reconfigurable cooling loop ~~coolant-based heating system for creating a plurality of coolant loops~~ to selectively create one of a first cooling loop to cool a first component and a second cooling loop to cool a second component; and

a bidirectional fluidic heat exchanger ~~between at least one of said plurality of refrigerant loops and at least one of said plurality of coolant loops~~ including:

a coolant side in fluid communication with the one of the first cooling loop and the second cooling loop, and

a refrigerant side in fluid communication with the heating loop and in thermal communication with the coolant side.

13. (Currently Amended) A system according to claim 12, wherein ~~said~~ the ~~at least one refrigerant~~ reconfigurable cooling loop comprises:

an outside air heat exchanger in fluid communication with the heat exchanger; and

a ~~4-way~~ reversing valve coupled to the outside air heat exchange and the heat exchanger, wherein the reversing valve is configured ~~configurable~~ to selectively discharge pressurized ~~refrigerant~~ coolant into one of ~~an~~ the outside air heat exchanger and ~~said~~ the ~~bi-fluidic~~ heat exchanger. [[;]] ~~said bidirectional orifice separator fluidically connecting said outside air heat~~

~~exchanger to the bi-fluidic heat exchanger.~~

14. (Currently Amended) A system according to claim 12, wherein ~~said~~ the ~~coolant-based~~ heating ~~system~~ loop comprises:

a plurality of power train components in fluid communication with the heat exchanger; and

a coolant-based reconfigurable power train thermal control section comprising a sub-heating loop and a sub-cooling loop in fluid communication with the power train components, ~~said~~ the power train thermal control section configurable to contemporaneously heat ~~selected ones of said plurality of~~ at least one power train ~~components~~ component and to cool ~~non-selected~~ at least one power train ~~components~~ component.

15. (Currently Amended) A system according to ~~of~~ claim 12 ~~further comprising~~ wherein the one of the first cooling loop and the second cooling loop includes at least one dedicated coolant heater.

16. (Withdrawn) A bidirectional orifice separator for use in a vehicular thermal control system, the bidirectional orifice separator comprising:

a bidirectional orifice tube;

a first check valve having an input channel and an output channel;

a second check valve having an input channel and an output channel, wherein said bidirectional orifice tube is connected in series between input channels of said first and second check valves;

a receiver including a refrigerant output port, operable to discharge refrigerant received from output channels from at least one of said first check valve and said second check valve.

17. (Withdrawn) A bidirectional orifice separator according to claim 16 further comprising a receiver fluidically coupled to said output channels of said first and second check valves and to said refrigerant output port.

18. (Withdrawn) A bidirectional orifice separator according to claim 17, wherein said vehicular thermal system comprises first and second heat exchangers, said bidirectional orifice separator further comprising:

a first transfer valve fluidically coupled in series between said first heat exchanger and a first end of said bidirectional orifice tube; and

a second transfer valve fluidically coupled in series between said second heat exchanger and a second end of said bidirectional orifice tube; said first and second transfer valves configurable to control refrigerant flow into said bidirectional orifice separator.

19. (Withdrawn) A bidirectional orifice separator according to claim 18 wherein said first check valve is configurable to receive expanded refrigerant discharged from a first end of the orifice tube.

20. (Withdrawn) A bidirectional orifice separator according to claim 18 wherein said first check valve is configurable to receive condensed refrigerant from said first heat exchanger.

21. (Withdrawn) A bidirectional orifice separator according to claim 20 wherein said first check valve is coupled to said receiver and discharges refrigerant into said receiver.

22. (Withdrawn) A bidirectional orifice separator according to claim 18 wherein said second check valve is configurable to receive expanded refrigerant discharged from a second end of the orifice tube.

23. (Withdrawn) A bidirectional orifice separator according to claim 22 wherein said second check valve is configurable to receive condensed refrigerant from said second heat exchanger.

24. (Withdrawn) A bidirectional orifice separator according to claim 23 wherein said second check valve discharges refrigerant into said receiver.

25. (Withdrawn) A bidirectional orifice separator according to claim 24 wherein said vehicular thermal system further comprises a compressor, said bidirectional orifice separator further comprising a 4-way reversing valve operable to direct refrigerant from said compressor to one of said first heat exchanger and said second heat exchanger.

26. (Withdrawn) A bidirectional orifice separator according to claim 25 further comprising a controller for controlling said first and second transfer valves and said 4-way reversing valve.

27. (New) A vehicle thermal system comprising:

a cooling loop;

a heating loop; and

a heating-ventilation-air conditioning (HVAC) unit including:

a heater core in fluid communication with the cooling loop, and

an evaporator in fluid communication with the heating loop and in thermal communication with the heater core.

28. (New) A system according to claim 12 wherein the heating loop includes at least one dedicated evaporator.